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EXAMINER

TSANG FOSTER, SUSY N

ART UNIT

PAPER NUMBER

1745

DATE MAILED: 04/24/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

ME-7

**Office Action Summary**

Application No.

09/546,262

Applicant(s)

NGUYEN ET AL.

Examiner

Susy N Tsang-Foster

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 19 November 2001.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                             | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Response to Amendment***

1. This Office Action is responsive to the amendment filed on 11/19/2001. Claims 1, 2, 5, and 9 have been amended. Claims 1-11 are pending and are finally rejected for reasons of record and for reasons necessitated by the amendment.

### ***Claim Objections***

2. Claim 7 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. In claim 7, the limitation "said polymer being a polyethylene" does not further limit "high density polyethylene" of claim 1.

### ***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 2-8, 10, and 11 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In claim 2, the added limitation "wherein said C<sub>2</sub> based polymer having a molecular weight less than 500,000" is not in the original disclosure. Claims depending from claim 2 are also rejected for the same.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 2-8, 10, and 11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949).

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In the present instance, claim 2 recites the broad recitation a C<sub>1</sub>-C<sub>7</sub> based polymer, and the claim also recites a C<sub>2</sub> based polymer which is the narrower statement of the range/limitation.

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP 8-20659 A.

JP 8-20659 A discloses a battery separator comprising a blend of a base polymer and a low molecular weight material and the content of the low molecular weight material is commonly about 2 to 15 weight parts per 100 weight parts of the base polymer (paragraph 40).

The base polymer can be high density polyethylene (see paragraph 26) and the low molecular weight material can be polyethylene wax with a number average molecular weight of ideally about 1000 to 5000 (see paragraph 37). The mean pore width of the separator is preferably 0.01 to 0.03 microns (see paragraph 43), and the porosity is preferably about 30 to 60% (see paragraph 44).

JP 8-20659 A does not disclose that the wax is at least 15 % by weight of the blend.

JP 8-20659 A does teach that 15 weight parts of the wax per 100 weight parts of the base polymer can be used (paragraph 40). Calculations would show  $(15/(115) \times 100\%)$  that this is about 13% by weight of the wax in the blend.

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It would have been obvious to one of ordinary skill in the art at the time the invention was made to use at least 15 % by weight of the wax in the blend because JP 8-20659 A teaches that a greater amount of wax would lower the melt start temperature and that the amount of wax is adjustable depending on the desired melt start temperature (see paragraph 40). Inherently, the blend comprising the at least 15% by weight of the wax would have a shutdown temperature of less than 130 °C.

Finally, claims that differ from the prior art only by slightly different (non-overlapping ) ranges are prima facie obvious without a showing that the claimed range achieves unexpected results relative to the prior art range. *In re Woodruff*, 16 USPQ2d 1935,1937 (Fed. Cir. 1990.) See also *In re Huang*, 40 USPQ2d 1685 (Fed. Cir. 1996) (claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art).

9. Claims 1, 3, 4, and 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 8-20659 A.

With respect to claims 1, 6, and 7, JP 8-20659 A discloses a battery separator comprising a blend of a base polymer and a low molecular weight material and the content of the low molecular weight material is commonly about 2 to 15 weight parts per 100 weight parts of the base polymer (paragraph 40). The base polymer can be olefin-based polymer including olefin homopolymers. Examples of olefins include 1-butene (reads on polybutene), 3-methyl-1-pentene (reads on polymethyl pentene), 4-methyl-1-pentene (reads on polymethyl pentene) (see paragraph 22). Preferred examples of olefin-based polymers include polyethylene and

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polypropylene (see paragraph 25). Polyethylene products such as low-density polyethylene, medium density polyethylene, and high-density polyethylene can also be the base polymer (See paragraph 26). The mean pore width of the separator is preferably 0.01 to 0.03 microns (see paragraph 43), and the porosity is preferably about 30 to 60% (see paragraph 44).

With respect to claim 3, JP 8-20659 A discloses that the separator has a shutdown temperature less than the melting point of the polymer (see paragraph 30).

With respect to claim 4, JP 8-20659 A disclose that the separator has a thickness of about 1 to 50 microns which is less than 3 mils (75 microns).

With respect to claims 1 and 8, JP 8-20659 A discloses that the low molecular weight material can be polyethylene wax with a number average molecular weight of ideally about 1000 to 5000, which is an oligomer of polyethylene (see paragraph 37).

JP 8-20659 A does not disclose that the wax is at least 15 % by weight of the blend.

JP 8-20659 A does teach that 15 weight parts of the wax per 100 weight parts of the base polymer can be used (paragraph 40). Calculations would show  $(15/(115) \times 100\%)$  that this is about 13% by weight of the wax in the blend.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use at least 15 % by weight of the wax in the blend because JP 8-20659 A teaches that a greater amount of wax would lower the melt start temperature and that the amount of wax is adjustable depending on the desired melt start temperature (see paragraph 40). Inherently, the blend comprising the at least 15% by weight of the wax would have a shutdown temperature of less than 130 °C.

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Thus, JP 8-20659 is clearly teaching in paragraph 40 that the amount of wax in the separator is a results effective variable. The courts have held that optimization of a results effective variable is not novel. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Finally, claims that differ from the prior art only by slightly different (non-overlapping ) ranges are prima facie obvious without a showing that the claimed range achieves unexpected results relative to the prior art range. *In re Woodruff*, 16 USPQ2d 1935,1937 (Fed. Cir. 1990.) See also *In re Huang*, 40 USPQ2d 1685 (Fed. Cir. 1996) (claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art).

10. Claims 2-4, and 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 8-20659 A and as evidenced by EP 603500 A1.

With respect to claims 2, 6, and 7, JP 8-20659 A discloses a battery separator comprising a blend of a base polymer and a low molecular weight material and the content of the low molecular weight material is commonly about 2 to 15 weight parts per 100 weight parts of the base polymer (paragraph 40). The base polymer can be a low-density polyethylene, a medium density polyethylene, and a high density polyethylene (see paragraph 26). The mean pore width of the separator is preferably 0.01 to 0.03 microns (see paragraph 43), and the porosity is preferably about 30 to 60% (see paragraph 44).



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EP 603500 A1 discloses that low density polyethylene, which is a C<sub>1</sub>-C<sub>7</sub> based polymer, has a molecular weight average of 5,000 to 100,000 (see paragraph 40, page 3), which is less than 500,000.

With respect to claim 3, JP 8-20659 A discloses that the separator has a shutdown temperature less than the melting point of the polymer (see paragraph 30).

With respect to claim 4, JP 8-20659 A disclose that the separator has a thickness of about 1 to 50 microns which is less than 3 mils (75 microns).

With respect to claims 2 and 8, JP 8-20659 A discloses that the low molecular weight material can be polyethylene wax with a number average molecular weight of ideally about 1000 to 5000 (see paragraph 37).

JP 8-20659 A does not disclose that the wax is at least 15 % by weight of the blend.

JP 8-20659 A does teach that 15 weight parts of the wax per 100 weight parts of the base polymer can be used (paragraph 40). Calculations would show  $(15/(115) \times 100\%)$  that this is about 13% by weight of the wax in the blend.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use at least 15 % by weight of the wax in the blend because JP 8-20659 A teaches that a greater amount of wax would lower the melt start temperature and that the amount of wax is adjustable depending on the desired melt start temperature (see paragraph 40). Inherently, the blend comprising the at least 15% by weight of the wax would have a shutdown temperature of less than 130 °C.

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Thus, JP 8-20659 is clearly teaching in paragraph 40 that the amount of wax in the separator is a results effective variable. The courts have held that optimization of a results effective variable is not novel. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Finally, claims that differ from the prior art only by slightly different (non-overlapping ) ranges are prima facie obvious without a showing that the claimed range achieves unexpected results relative to the prior art range. *In re Woodruff*, 16 USPQ2d 1935,1937 (Fed. Cir. 1990.) See also *In re Huang*, 40 USPQ2d 1685 (Fed. Cir. 1996) (claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art).

11. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP 8-20659 A as applied to claims 1 and 2 above, and further view of Lundquist et al. (US Pat .No. 4,650,730).

JP 8-20659 A teaches all the limitations of claim 5 except that the battery separator is a multilayered separator and the membrane is one layer of the multilayered separator.

Lundquist et al. teach a multilayered separator (see abstract and col. 10, lines 56-68).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have a battery separator be multilayered in order to provide dimensionally stability to the separator at elevated temperatures as taught by Lundquist et al. (col. line 60-65).

***Response to Arguments***

12. Applicant's arguments filed 11/19/2001 have been fully considered but they are not persuasive.

*Applicants assert that JP 8-20659 teaches in paragraph 40 at page 10, that when the wax content is excessively high (greater than 13% or greater than 15 parts by weight per 100 parts by weight of the base polymer), pore formation is impaired.*

In response, the Examiner would like to point out that the JP 8-20659 reference does not teach that greater than 13% by weight wax is an excessively high content that pore formation is impaired at paragraph 40 on page 10. Instead, paragraph 40 of JP 8-20659 states:

“The content of the low-molecular-weight material can be appropriately selected in accordance with the type of base polymer and low-molecular-weight material, and is commonly about 2 to 15 weight parts, preferably about 4 to 12 weight parts, and ideally about 5 to 10 weight parts, per 100 weight parts of the base polymer. When the content of the low-molecular-weight material is too low, it is impossible to lower the melt start temperature in a meaningful manner, whereas an excessively high content tends to impair pore formation.” [emphasis added].

This paragraph of the reference does not state that greater than 15 weight parts of the wax is an excessively high content. This paragraph teaches that the amount of wax in the separator is a results effective variable that is optimizable and that about 15 weight parts of wax per 100 weight parts of the base polymer is equivalent to about 13 % by weight of the wax is preferable. The reference gives only an approximate range of the preferred amount of wax in the separator,

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not a closed range of what amount of wax can be used in the separator as supported by the word "about" in the range of "about 2 to 15 weight parts".

*Applicants assert that most of the inventive formulations require at least 20% wax and have Gurley values that are less than half those of JP 8-20659...The instant invention obtains an unexpected result---good Gurley values at wax levels above 15%.*

In response, it is unclear to the Examiner why applicants are arguing Gurley values when these values are not even claimed. The applicants' Gurley values in the specification does not provide for unexpected results for the greater than 15% by weight used for the oligomer or wax because it is erroneous to assume to make that the Gurley value of the separator is directly related to amount of wax used in the separator. The Gurley value of the separator is affected by many other factors such as pore size, porosity, and thickness of the separator, and the molecular weight of the wax used in the separator. In working example 2 of the reference, the molecular weight of the wax used is 3000 versus the molecular weight of 1000 used in Table 3 of applicants' invention. Also the base polymer used in Table 3 is high density polyethylene and that used in working example 1 is polyethylene. It is unclear what the pore sizes are in Table 3 of applicants' specification.

Furthermore, as seen in Table 2 of applicants' specification, the Gurley value can be as high as 54 for a high density polyethylene (100% HDPE1) separator. When 30% by weight of PEWax 1000 (polyethylene wax with molecular weight of 1000) was used, the Gurley value was 45 (see Table 2 of applicants' specification).

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Table 3 of applicants' specification clearly shows that the starting base polymer in the separator affects the Gurley value. As seen in Table 3, 100% HDPE1 has a Gurley value of 21, and 100% HDPE2 has a Gurley value of 42. With 30% by weight wax with molecular weight of 1000, the Gurley value was 13 or 14 with 70% HDPE1. With 30% by weight wax with a molecular weight of 1000, the Gurley value was 25. As also seen in Table 2, the 100% HDPE1 separator with a thickness of 0.64 mil and porosity of 30% has a Gurley value of 54 and in Table 3, 100% of HDPE1 separator with a thickness of 0.65 mil has a Gurley value of 21. It appears that the 100% HDPE1 separator in Table 3 might have a larger porosity or pore size and hence a lower Gurley value.

Finally applicants state on page 5, lines 1-2 that the preferable Gurley value of the separator is 7 to 80 seconds and the reference discloses Gurley values of 10 to 60 seconds (see claim 8 of the reference) which falls within applicants' invention.

Thus, in view of the above discussion, the Gurley values in applicants' invention do not show unexpected results.

### ***Conclusion***

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period

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will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

14. Any inquiry concerning this communication or earlier communications should be directed to examiner Susy Tsang-Foster, Ph.D. whose telephone number is (703) 305-0588. The examiner can normally be reached on Monday through Friday from 9:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at (703) 308-2383. The phone number for the organization where this application or proceeding is assigned is (703) 305-5900.

The fax phone numbers for the organization where this application or proceeding is assigned is (703) 872-9310 for regular communications and (703) 872-9311 for After-Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

st/23 April 2002

  
Patrick Ryan  
Supervisory Patent Examiner  
Technology Center 1700